

Let's Talk about Data

Claudia Lopez, PhD
Sandra Oviedo Ramirez, PhD
Guadalupe Corral, PhD
Research, Evaluation, and Assessment Services (REAS)

Claudia Lopez, PhD
Sandra Oviedo Ramirez, PhD
Guadalupe Corral, PhD
Research, Evaluation, and Assessment Services (REAS)



Outline

- Introduction to data
- Data collection process
- Turning data into information



What is data?

A piece of
information

Numbers

Text

Observations

Images

Data Formats

- Qualitative
 - Non-numerical
- Quantitative
 - Numerical
- Structured
 - Predefined format and organization
- Unstructured
 - Does not conform to a specific structure or format

Types of Data

Nominal Data

- Used to label variables without any order or quantitative value (e.g., gender, marital status, eye color)

Ordinal Data

- Have natural ordering representing a relative position (e.g., letter grades, ranking in a competition, education level)

Discrete Data

- Values that fall under separate integers or whole numbers (e.g., total number of students or days in a week)

Continuous Data

- In the form of fractional numbers (e.g., height or weight of a person, time-taken to complete a task, market share price)

(Morgan & Harmon, 2001)



NOMINAL DATA
USED TO LABEL VARIABLES
Without any quantitative value



ORDINAL DATA
ORDERED CATEGORIES
The distances between the categories
is not known



TYPES OF DATA



DISCRETE DATA
SPECIFIC COUNTABLE VALUES
Remains constant over a specific time

CONTINUOUS DATA
**MEASUREMENT SCALE BETWEEN TWO
REALISTIC POINTS**
Can have different values over time



Data Collection



Data collection is the process of gathering, evaluating, and analyzing precise understandings for research using typical authenticated methods



Necessary for conducting research



Data is the information needed to investigate a research problem/hypothesis after developing the research design

(Mazhar et al., 2021)

Types of Data Collection



Primary Data

Collected for the first time by original researchers
Can come from observation methods, interviews, questionnaires, databases



Secondary Data

Data previously collected by someone else and already analyzed statistically
Previously published books, journals

Collecting Primary Data

- Collected
 - In experimental research during experiments
 - In descriptive type research and surveys

Examples of Data Collection Methods

Direct observations

- Observe and record the behavior of the participant

Standardized instruments

- Have a manual including norms for comparison with broader samples and information about reliability and validity

Investigator-developed measures

- Developed by the researcher and used in a few studies

Standardized tests

- Achievement tests (measure knowledge), aptitude tests (measure IQ)

Standardized personality inventories

- Statements describing behaviors to measure personal characteristics

Summated (Likert) Attitude Scales

- Measures attitudes about a group of people using ratings

Questionnaires

- A group of written questions where participants respond in writing (virtual or in person)

Interviews

- A group of questions is presented orally by an interviewer, and responses are provided orally by the participant

(Morgan & Harmon, 2001)

Collecting Primary Data

Observation method

Common in behavioral sciences studies

Subjected to checks and controls on validity and reliability

Types of observation methods

- Structured observation
 - Standardized conditions of observation, units, data to be observed, and style of recording
- Unstructured observation
 - No established structured characteristics in advance
- Controlled observation
 - Conduct observation following pre-established strategies set in the experimental design
- Uncontrolled observation
 - Observation takes place in natural settings
- Participant observation
 - The observer shares the participants' experiences by being part of the group
- Non-participant observation
 - The observer is a detached participant
- Disguised observation
 - Conducted without the participants knowing they are being observed

Collecting Primary Data

Interview method

Preferred method if it is convenient to talk directly to participants

Interviewers need to be skilled, unbiased, and diligent

Personal interview method

- Consists of the interviewer asking questions in a face-to-face interaction with respondents
 - Structured interview
 - Follows a structured format, such as predetermined questions and standardized techniques of recording
 - Unstructured interview
 - Does not follow predetermined questions or standardized techniques for recording
 - Focused interview
 - The interviewer can decide the sequence of the questions and can explore reasons and motives to get information on the respondents
- Telephone interview method
 - Information is collected by contacting respondents via a telephone call

Interview Questions Example

ASSETS Student Semi-Structured Interview Prompts

Focus on social, human, familial, and financial capital ☒ relate this to social network development and other outcomes measured in the study

1. What resources (individuals, material things, etc.) have enabled you to be successful in your academic journey, and why?
2. How has participation in the ASSETS program influenced your sense of belonging to the UTEP community? The El Paso community? The STEM community?
3. What opportunities do you feel ASSETS provided that you might otherwise not have had an opportunity to engage in during your time at UTEP? Please explain.
4. As you advance in your profession, what takeaways from ASSETS do you feel might aid you in that process? Why?
5. Can you please tell us a bit about how your family has influenced your college experience, if at all?
 - a. Have you ever discussed your participation in ASSETS with your family? If so, please expand. If not, why not?
6. How would you rate the ASSETS program overall? Please explain.

Example of an Interview



Another Example of an Interview



Collecting Primary Data

Questionnaires

Popular method to collect large sets of data

Respondents are provided with a predetermined set of questions in a definite order on a form(s)

Should include an explanation of research and follow ethical codes of conduct like other data collection methods

Characteristics of a good questionnaire should include questions that are:

- Short to the point
- In a logical sequence
- At the respondents' reading level, avoiding technical terms
- Avoid biased, double-barreled, and double negative questions
- Dichotomous (Y/N), multiple-choice and/or open-ended

Examples of Questionnaire Items

- Please indicate how much you agree or disagree with each of the following statements about the childcare program.
 - I feel welcomed by staff and other youth at the center
- Community organizing is hard.
 - Do leadership trainings help you feel prepared for community organizing?
- Does it seem impossible to you that the moon landing never happened?

Examples of Questionnaire Items

- Please indicate how much you agree or disagree with each of the following statements about the childcare program.
 - I feel welcomed by staff at the center
 - I feel welcomed by other youth at the center
- The leadership trainings prepare me for community organizing.
- Does it seem possible to you that the moon landing never happened?

Examples of Questionnaires

THINKING AND WORKING LIKE A SCIENTIST: APPLICATION OF KNOWLEDGE TO RESEARCH WORK

11. HOW MUCH did you GAIN in the following areas as a result of your experience?

	No Gains (1)	A Little Gain (2)	Moderate Gain (3)	Good Gain (4)	Great Gain (5)	N/A
Analyzing data for patterns	☐	☐	☐	☐	☐	☐
Figuring out the next step in a research project	☐	☐	☐	☐	☐	☐
Problem-solving in general	☐	☐	☐	☐	☐	☐
Formulating a research question that could be answered with data	☐	☐	☐	☐	☐	☐
Identifying limitations of research methods and designs	☐	☐	☐	☐	☐	☐
Understanding the theory and concepts guiding my research project	☐	☐	☐	☐	☐	☐
Understanding the connections among scientific disciplines	☐	☐	☐	☐	☐	☐
Understanding the relevance of research to my coursework	☐	☐	☐	☐	☐	☐

ATTITUDES OR BEHAVIORS

14. The following questions ask about any changes in your attitudes or behaviors as a researcher. During your research experience, HOW MUCH did you:

	None (1)	A Little (2)	Some (3)	A Fair Amount (4)	A Great Deal (5)	N/A
Engage in real-world science research?	☐	☐	☐	☐	☐	☐
Feel like a scientist?	☐	☐	☐	☐	☐	☐
Think creatively about the project?	☐	☐	☐	☐	☐	☐
Try out new ideas or procedures on your own?	☐	☐	☐	☐	☐	☐
Feel responsible for the project?	☐	☐	☐	☐	☐	☐
Work extra hours because you were excited about the research?	☐	☐	☐	☐	☐	☐
Interact with scientists from outside your school?	☐	☐	☐	☐	☐	☐
Feel a part of the scientific community?	☐	☐	☐	☐	☐	☐

Collecting Secondary Data

- Secondary data can be collected from:
- Published data
 - Government publications
 - Stock exchange reports
 - Journals
 - Books and newspapers
 - Reports prepared by research scholars
 - Public records of statistical and historical documents
 - Databases
- Unpublished data
 - Unpublished autobiographies and biographies
 - In-press manuscripts
 - Raw data from unpublished studies

Secondary Data Examples

Educational Attainment



ACSST1Y2023.S1501-2025-03-20T224656 General* Saved to this PC												
File Home Insert Page Layout Formulas Data Review View Automate Help Acrobat												
Clipboard Font Alignment Number Styles Cells Editing Sensitivity Add-ins Analyze Data Adobe Acrobat												
A1												
El Paso County, Texas												
	Total		Percent		Male		Percent Male		Female		Percent Female	
Label	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
AGE BY EDUCATIONAL ATTAINMENT												
Population 18 to 24 years	92,957	±824	(X)	(X)	49,572	±496	(X)	(X)	43,385	±645	(X)	(X)
Less than high school graduate	11,352	±2,026	12.2%	±2.2	7,360	±1,791	14.8%	±3.6	3,992	±1,251	9.2%	±2.9
High school graduate (includes equivalency)	37,591	±3,337	40.4%	±3.7	21,880	±2,372	44.1%	±4.9	15,711	±2,283	36.2%	±5.3
Some college or associate's degree	38,416	±3,490	41.3%	±3.7	18,446	±2,749	37.2%	±5.4	19,970	±2,283	46.0%	±5.1
Bachelor's degree or higher	5,598	±1,505	6.0%	±1.6	1,886	±859	3.8%	±1.7	3,712	±1,167	8.6%	±2.7
Population 25 years and over	553,666	±841	(X)	(X)	269,568	±602	(X)	(X)	284,098	±659	(X)	(X)
Less than 9th grade	67,218	±4,842	12.1%	±0.9	29,957	±3,280	11.1%	±1.2	37,261	±2,708	13.1%	±1.0
9th to 12th grade, no diploma	37,510	±3,453	6.8%	±0.6	17,575	±2,454	6.5%	±0.9	19,935	±2,676	7.0%	±0.9
High school graduate (includes equivalency)	143,692	±7,019	26.0%	±1.3	72,001	±4,600	26.7%	±1.7	71,691	±4,623	25.2%	±1.6
Some college, no degree	112,314	±6,552	20.3%	±1.2	60,541	±4,554	22.5%	±1.7	51,773	±4,756	18.2%	±1.7
Associate's degree	49,274	±4,391	8.9%	±0.8	24,338	±2,832	9.0%	±1.1	24,936	±3,063	8.8%	±1.1
Bachelor's degree	93,834	±5,915	16.9%	±1.1	43,092	±3,888	16.0%	±1.4	50,742	±3,712	17.9%	±1.3
Graduate or professional degree	49,824	±4,543	9.0%	±0.8	22,064	±2,731	8.2%	±1.0	27,760	±3,254	9.8%	±1.1
High school graduate or higher	448,938	±5,751	81.1%	±1.0	222,036	±3,667	82.4%	±1.3	226,902	±4,090	79.9%	±1.4
Bachelor's degree or higher	143,658	±6,984	25.9%	±1.3	65,156	±4,686	24.2%	±1.7	78,502	±4,657	27.6%	±1.6
Population 25 to 34 years	131,820	±1,217	(X)	(X)	68,037	±812	(X)	(X)	63,783	±914	(X)	(X)
High school graduate or higher	122,463	±2,692	92.9%	±1.7	63,271	±1,663	93.0%	±2.2	59,192	±1,638	92.8%	±2.2
Bachelor's degree or higher	37,307	±3,714	28.3%	±2.8	16,659	±2,481	24.5%	±3.6	20,648	±2,478	32.4%	±3.8
Population 35 to 44 years	116,065	±1,569	(X)	(X)	60,416	±1,294	(X)	(X)	55,649	±895	(X)	(X)
High school graduate or												

(U.S. Census Bureau, 2023)

Selecting the Data Collection Method

The data collection method must be suitable for your research design



Steps for selecting the data collection methods

Step 1: Consider the time required to collect data

Step 2: Number of data points required

Step 3: Available time to collect data & other resources

Step 4: Timeline of project

What do you do with collected data?

- Data entry or download data
- Data cleaning
- Conduct appropriate analyses to answer your research questions
 - Examples:
 - Descriptive
 - Inferential
 - Thematic
 - Content
- Disseminate your findings



Ethical Research Methods for Human Subjects Research

- Complete all required training (e.g., CITI training)
- Always prioritize participant well-being and data integrity by following these principles:
 - Informed consent
 - Voluntary participation
 - Confidentiality and Anonymity
 - Freedom to withdraw from research
 - Transparency
 - Potential to harm
 - Data integrity
 - Respect for participants
 - Ethics approval
 - Legal compliance





RESEARCH COMPLIANCE AND REGULATORY ASSURANCES

Research & Innovation

COMPLIANCE SERVICES ▼ R&I SUPPORT UNITS ▼

UTEP's Research Compliance

<https://www.utep.edu/research/compliance-reg-assurance/>

Questions?

References

- Morgan, G. A., & Harmon, R. J. (2001). Data collection techniques. *Journal-American Academy Of Child And Adolescent Psychiatry*, 40(8), 973-976.
- Mazhar, S. A., Anjum, R., Anwar, A. I., & Khan, A. A. (2021). Methods of data collection: A fundamental tool of research. *Journal of Integrated Community Health*, 10(1), 6-10.
- U.S. Census Bureau, U.S. Department of Commerce. (2023). Educational Attainment. *American Community Survey, ACS 1-Year Estimates Subject Tables, Table S1501*. Retrieved March 20, 2025, from <https://data.census.gov/table/ACSST1Y2023.S1501?q=education+in+el+paso+tx&t=Education:Educational+Attainment>.